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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,696	03/04/2004	Sung Jun Lee	2336-250	5095

7590 10/18/2004
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EXAMINER

KIM, JOANNE H

ART UNIT	PAPER NUMBER
2883	

DATE MAILED: 10/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/791,696	Applicant(s) LEE ET AL.	
	Examiner Joanne H. Kim	Art Unit 2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09/27/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-7 in the reply filed on September 27, 2004 is acknowledged. Non-elected claims 8-14 have been cancelled.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "activator" in claim 1 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of

Art Unit: 2883

the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 1 is objected to because of the following informality: in line 7, "activator" should be "actuator."

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-2 and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhuler et al. (U.S. Patent No. 6,275,320, hereinafter "Dhuler").

Dhuler discloses a MEMS variable optical attenuator comprising a silicon layer (12) including a waveguide (20) and an actuator (14) movable in a horizontal direction (Fig. 6; column 5, lines 25-28; and column 10, lines 17-20 and 30-35).

Dhuler does not specifically disclose that the optical attenuator includes a bonding medium layer provided with a cavity bonded with the silicon layer and a support

layer that is made of glass attached to the bonding medium layer and that the MEMS actuator is a comb type actuator.

It is well known that a hermetic packaging is important for MEMS devices to protect the MEMS devices from hostile external environments and contaminants for long lifetime and better performance. It also is well known that glass is generally chosen as a protection cap for a hermetic packaging because it is mechanically roust, chemically stable, and transparent to light and RF signals which is desirable for optical MEMS devices. Further, it is well known that a braze alloy, a frit glass compound, a glass-polymer compound, or a polymer-based adhesive material can be used as a bonding material in a hermetic packaging. Furthermore, it is well known that a comb type actuator is a commonly used type of actuator in a variable optical attenuator.

It would have been obvious to modify Dhuler to include a glass layer (i.e., support layer) as a protection cap and a bonding layer (i.e., bonding medium layer) for bonding the glass layer to the silicon substrate including the MEMS attenuator in order to provide a hermetic packaging in order to protect the MEMS attenuator. Also, it would have been obvious to use a bonding medium layer formed of a polymer having a high light transmission since it is desirable for optical devices. Further, it would have been obvious to provide a cavity, which has a width and a depth substantially same as those of the waveguide, in the bonding layer for receiving the waveguide in order to provide a proper hermetic packaging. Furthermore, it would have been obvious to modify Dhuler to use a comb type actuator since it is a commonly used type of actuator in a variable optical attenuator.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dhuler in view of Peterson et al. (U.S. Patent No. 6,674,159, hereinafter "Peterson").

Dhuler discloses an optical attenuator including a bonding medium formed of a polymer having a high light transmission as discussed above in paragraph 5.

However, Dhuler does not specifically disclose that the bonding medium layer is formed of polydimethylsiloxane (PDMS).

Peterson discloses a package for a MEMS device including a plate (30) and a cover lid (42) attached to the plate by a bonding material (50). Peterson discloses that the bonding material can be a braze alloy, a frit glass compound, a glass-polymer compound, or a polymer-based adhesive material (column 10, lines 5-31). Additionally, it is well known that the use of the polymer-based adhesive material has the advantage that a substrate may be combined with any support substrate. Further, it is well known that PDMS is one of the commonly used polymer-based adhesive.

Accordingly, it would have been obvious to modify Dhuler to include a bonding medium layer formed of PDMS in order to take an advantage of a polymer-based adhesive material.

Art Unit: 2883

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Novotny et al. (U.S. Patent No. 6,751,395) discloses a micro-electro-mechanical variable optical attenuator.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joanne H. Kim whose telephone number is (571) 272-2139. The examiner can normally be reached on 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Joanne H. Kim
Examiner
Art Unit 2883

jk/FGF



Frank G. Font
Supervisory Patent Examiner
Technology Center 2800